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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/701,534	11/30/2000	Shunichi Seki	107291	5481

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EXAMINER

CLEVELAND, MICHAEL B

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 11/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/701,534

Applicant(s)

SEKI ET AL.

Examiner

Michael Cleveland

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 August 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 102003.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/8/2003 has been entered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 14 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Hirai et al. (U.S. Patent 4,683,146, hereafter '146).

'146 teaches cyclic silanes (abstract) that are used as silicon precursors (col. 1, lines 5-11) that are used as liquids (col. 3, lines 15-18; col. 4, lines 53-56). Liquids are ink-jet printable.

4. Claims 15 and 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Winkler et al. ("Through-Bond Interactions in Silicon-Phosphorus and Silicon-Arsenic Compounds..." *Chemistry—A European Journal*, 3, 874-880.)

Winkler teaches methods of synthesizing compounds such as $\text{Si}_6\text{H}_{12}\text{P}_2$ (compound 1a, see p. 875). The compounds are synthesized in liquids (Experimental, p. 879). Liquids are ink-jet printable.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-5, 8, 14, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yudasaka et al. (U.S. Patent 5,989,945, hereafter '945) in view of Hirai et al. (U.S. Patent 4,683,146, hereafter '146).

Claims 1 and 14: '945 teaches a method for forming a silicon film for a device such as a thin film transistor (Abstract) comprising:

applying a coating solution (i.e., an ink composition) containing a silicon compound onto a substrate (col. 14, line 60-col. 16, line 16; Abstract). Solutions may be deposited by ink-jet printing (col. 20, lines 35-40).

'945 does not teach that the silicon compound is cyclic. However, '146 teaches cyclic silanes (abstract) that are used as silicon precursors (col. 1, lines 5-11) that are liquids at room temperature (col. 3, lines 15-18; col. 4, lines 53-56). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have substituted the cyclic silane precursors of '146 for the silane precursors of '945 with the expectation of similar results and with a reasonable expectation of success because '146 demonstrates that they are also useful as decomposable precursors to form silicon films.

Claim 2: The solution coating may take place under an inert atmosphere ('945, col. 16, lines 29-31).

Claim 3: The solvent is evaporated (i.e., removed) after deposition ('945, col. 14, lines 4-12) and the film is pyrolyzed (col. 15, lines 10-26).

Claim 4: The silicon film may be crystallized by laser treating to form a crystalline film ('945, col. 15, lines 6-26).

Claims 5, 8, 14, and 17: The precursor may be Si_5H_{10} . ('146, col. 3, lines 15-18).

8. Claims 10-12 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yudasaka '945 in view of Hirai '146 as applied to claim 1, and further in view of Kotaro et al. (JP 06-191821, hereafter '821).

'945 and '146 are described above, but do not explicitly teach using a hydrocarbon solvent with a vapor pressure in the claimed range, or a silane concentration within the claimed range.

Claims 10-11 and 19-20: '945 teaches the use of an alcohol solvent (col. 14, lines 4-12), but not a hydrocarbon with a vapor pressure at room temperature of 0.001-50 mmHg. However, '821 teaches other solvents that are suitable for depositing solution of silanes to form silicon films, such as ethylbenzene [0008], a hydrocarbon with a vapor pressure of approximately 10 mmHg at room temperature (See CRC Handbook of Chemistry and Physics, 47th edn., Weast, R.C., ed., p. D-125.) It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used ethylbenzene instead of an alcohol as the solvent with a reasonable expectation of success and with the expectation of similar results because '821 teaches that ethylbenzene is a suitable solvent for depositing such silanes.

Claims 12 and 21: '945 does not teach concentrations of the silane in the solution. Therefore, one of ordinary skill in the art would have been motivated to have looked to the related art to have determined operative concentrations. '821 teaches that the silane concentrations may be 0.1-50 % by weight. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have chosen a weight percent, such as 0.1 weight percent from within the claimed range with a reasonable expectation of success because '821 demonstrates that such concentrations are operative for depositing such silanes.

9. Claims 13 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yudasaka '945 in view of Hirai '146 as applied to claim 1, and further in view of Taniguchi et al. (U.S. Patent 5,667,572, hereafter '572).

'945 and '146 are described above, but do not explicitly teach using inks with the claimed viscosities or surface tensions. In fact, '945 is silent as to the viscosity and surface tension of the ink. Accordingly, one of ordinary skill in the art would have been motivated to have looked to the related prior art to determine operable viscosities and surface tensions for ink jet inks.

'572 teaches that ink jet inks (col. 1, lines 7-10) may usefully have viscosities of 1-10 cP and surface tensions of 25-70 dyn/cm (col. 9, lines 11-31). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used such values as the particular values of the viscosity and surface tension for the ink of '945 with a reasonable expectation of success because '572 teaches that such viscosities and surface tensions are useful in ink jet printing.

10. Claims 1-5, 8, 14, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yudasaka et al. (WO97/43689, hereafter '689) in view of Hirai '146 for substantially the same reasons given above (WO97/43689 is the international application from which '945 matured.).

Claims 7, 16, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yudasaka '689 in view of Hirai '146 and Margrave '512 for the same reasons given above relating to Yudasaka '945 in view of '146 and '512.

Claims 10-12 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yudasaka '689 in view of Hirai '146 and Kotaro et al. (JP 06-191821, hereafter '821) for the same reasons given above relating to Yudasaka '945 in view of '146 and '821.

Claims 13 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yudasaka '689 in view of Hirai '146 and Taniguchi et al. (U.S. Patent 5,667,572, hereafter '572) for the same reasons given above relating to Yudasaka '945 in view of '146 and '572.

Double Patenting

11. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible

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harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Note: Double patenting rejections based on the same patent with different secondary references have been grouped together under a single paragraph number.

12. Claims 14-18 and 21 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 4, 6, and 9 of U.S. Patent No. 6,527,847. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the patent are within the genus of the applications claims.

Claims 1-9, 12, and 23 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 4, 6, and 9 of U.S. Patent No. 6,527,847 in view of Yudasaka '689. '847 states that the composition is a coating composition, but the claims do not suggest a method of applying the composition. Yudasaka '689 teaches depositing silane coating compositions by ink-jet printing. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used ink-jet printing as the particular method of applying with a reasonable expectation of success because Yudasaka '689 teaches that ink-jet printing is a successful method of depositing silane precursors. The features of claims 2-5 have been discussed with regard to Yudasaka above.

Claims 10-12 and 19-21 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 4, 6, and 9 of U.S. Patent No. 6,527,847 in view of Yudasaka '689 as discussed in this section and in view of Kotaro et al. (JP

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06-191821, hereafter '821) for the teachings of Kotaro regarding solvent characteristics discussed above.

Claims 13 and 22 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 4, 6, and 9 of U.S. Patent No. 6,527,847 in view of Yudasaka '689 as discussed in this section and in view of Taniguchi '572 for its teachings regarding ink-jet surface tensions already discussed.

13. Claims 1, 3, 5, 8, 12, 14, 17, and 21 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 and 15 of U.S. Patent No. 6,503,570. Although the conflicting claims are not identical, they are not patentably distinct from each other because the current claims encompass different combinations of the features of the claims of '570.

Claims 2 and 4 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 and 15 of U.S. Patent No. 6,503,570 in view of Yudasaka '689. The claims of '570 do not specify an atmosphere. Yudasaka '689 teaches forming silicon coatings by depositing silane coating compositions by ink-jet printing in an inert atmosphere. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used an inert atmosphere as the particular atmosphere of the claims of '087 with a reasonable expectation of success because Yudasaka '689 teaches that inert atmospheres are appropriate for the operation. The teachings of Yudasaka '689 regarding crystallizing silicon are relevant to claim 4 for the reasons discussed above.

Claims 10-11 and 19-20 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 and 15 of U.S. Patent No. 6,503,570 in view of Kotaro '821 for its teachings regarding solvent characteristics already discussed above.

Claims 13 and 22 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-10 and 15 of U.S. Patent No. 6,503,570 in view of Taniguchi '572 for its teachings regarding ink-jet surface tensions already discussed.

Response to Arguments

14. Applicant's arguments filed 7/8/2003 and 8/14/03 have been fully considered but they are not persuasive.

The rejections of claims 7, 16, and 23 under 35 USC 103 have been overcome by amendment.

In response to applicant's argument that Hirai does not disclose the use of an ink-jet ink, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). Applicant's argument that the precursor of Hirai is not provided as a liquid because it is provided as a gas is not convincing because, as acknowledged by Applicant on p. 8, it is provided as a gas *by vaporizing the provided liquid*. Thus, Applicant has acknowledged that the precursors of Hirai are provided as liquids. Liquids are ink-jet printable.

Applicant argues that Winkler does not provided a specific example that demonstrates the synthesizing method of $\text{Si}_6\text{H}_{12}\text{P}_2$. The argument is unconvincing because all of the compounds of Winkler are synthesized in liquid.

In response to applicant's arguments against the references (Yudasaka and Hirai) individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Applicant's argument that Hirai does not teach cyclic silanes as liquids is unconvincing because it does not address the teachings of Yudasaka.

Applicant argues that Yudasaka does not disclose ink-jet printing. The argument is incorrect (col. 20, lines 35-40).

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the teaching is found in Hirai's recognition of cyclic silanes as suitable silicon precursors. The selection of something based on its known suitability for its intended use has been held to support a *prima facie* case of obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07.

Applicant argues that the double patenting rejections over U.S. Patent 6,527,847 and 6,503,570 should be withdrawn because there is no common ownership. The argument is unconvincing because there is a common inventor. See MPEP 804 I.A. and Chart II-B.

Applicant argues that the range claimed in '847 is different than that claimed by the present claims because '847 claim n is 4 or more, and the present application claims n is 3 or more. The argument is unconvincing because the patented claims are more specific than the present claims, and the choice of any n from the claims of the patent necessarily meets the limitation of the present claims. Similarly, Applicant argues that claim 6 of '847 teaches m is an integer of n to $2n+3$, and the present application (in claims 6, 7, 15, 16, and 23) claims b is an integer of $2a+c$ or $2a+c+2$. The argument is incorrect because the present application claims that b is an integer between a and $2a+c$ (inclusive). The patented claims use a different notation than the present application, they use n, m, and l, where applicant uses a, b, and c respectively. Therefore, the argument is unconvincing because the patented claims are more specific than the present claims, and the choice of any n from the claims of the patent necessarily meets the limitation of the present claims.

Regarding '570, applicant argues that claim 1 recites "applying by patterning an ink composition containing a silicon compound onto a substrate by an ink-jet process". The argument is unconvincing because Applicant does not indicate how this distinguishes from the

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claims of '570 which teach applying a silicon compound onto a substrate (claim 1, step (1)) by ink jet coating (claim 15). Applicant argues that claim 14 recites an ink-jet ink composition of Si_nX_m , where n is 3 or more and m is n , $2n-2$, or $2n$. The argument is unconvincing because Applicant does not indicate how this distinguishes from the claims of '570 which teach an ink-jet ink composition (claim 15) comprising Si_5H_{10} (i.e., where $n=5$ and $m=10=2n$).

Conclusion

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Cleveland whose telephone number is (703) 308-2331. The examiner can normally be reached on 9-5:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 306-3186 for regular communications and (703) 306-3186 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Michael Cleveland
Patent Examiner
November 4, 2003